File

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M E M O R A N D U M
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TO: Ronald Daniels, Coordinator of Mined Land Development R

FROM: Tom Suchoski, Engineering Geologist TJS

SUBJECT: Soil Testing Services Report
Utah International
Comstock Operation

DATE: May 19, 1980

After review of the Soil Testing Services Report for the Comstock Operation with respect to the permeability tests for the tailings dam facility, it is evident that seepage under the dam would occur. The report indicates four different methods of controlling or minimizing that seepage. They are; (1) compaction to 95% of the alluvium material down to weathered rock beneath the center portion of the dam, (2) the placing of a PVC liner upstream of the dam to form an impervious blanket over the alluvium foundation, (3) increasing the density of the alluvium in the foundation under the center of the dam by dynamic compaction to at least 95%, and (4) to form a liner using a mixture of alluvium and lended bentonite 3-4% by weight along the upstream area of the dam.

Using the results of the permeability tests presented by Soil Testing Services with no treatment using ballinghead and borehole tests at 6.3 feet below the surface in the alluvium, with a permeability rate of .3053 cm/sec. and from a surface area 306,000 feet squared, a seepage lose of 4,040,000 gallons per day would be lost. In the case of alluvium compacted to 95% along the core of the dam down to weathered bedrock, the alluvium permeability would be reduced to .508 cm/sec. for the same drainage area and seepage would be reduced to 61,084 gallons per day. For the case of the alluvium compacted to 95% with a 3% bentonite liner along the upstream edge of the dam with the same drainage area, and a reduction in permeability of 0.6043 cm/sec., seepage would be reduced to 3,283 gallons per day. The above calculations assume that actual permeability is described by the following head tests, that the water volume described in the calculations is available from the tailings process and that the permeability rate will not be affected by the deposition of the tailings material.

If the permeability rates are decreased by the deposition of tailings material due to its fine grade cohesive nature, then the seepage rate would be decreased with the decrease in the permeability rate.

The choice of the different methods of preventing seepage indicated above will depend greatly upon the quality of the water discharged from the tailings facility. If the water quality were such that it bordered on an acid condition that would affect the local water table and aquifers then a minimizing of any seepage would be the direction to plan for. If water quality were not detrimental to aquifers and water tables, then the only concern lies in the effects that seepage has on the stability of the structure itself.

During the April 24th meeting that I attended with employees from the Division of State Health and Utah International, Mr. York Jones of Utah International indicated that the water quality in the area was very high and that the quality of the water discharged from the tailings process was not detrimental. He had several analyses which showed that the water quality was in the acceptable range. These samples were from the Iron Springs Operation where the same process will be installed at the Comstock Operation. As such, it is deemed that little problem from the quality of water will cause a problem. Therefore it is essential to minimize the process due to the volume of seepage.

I would propose that the Division's position be such that in the event good water quality from the Comstock Operation is encountered that the water will be monitored by Utah International as it enters the tailings facility; and that treatment of the tailings dam core be at a minimum 95% compaction of the alluvium or the addition of a 3% bentonite fill in the upstream toe of the dam in addition to the 95% compaction. Either one of those would work.

TJS/te